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(54) **CONTROL SYSTEM FOR A PARTICLE ACCELERATOR**

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See application file for complete search history.

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(57) **ABSTRACT**

An example particle therapy system includes a particle accelerator to output a particle beam, where the particle accelerator includes: a particle source to provide pulses of ionized plasma to a cavity, where each pulse of the particle source has a pulse width corresponding to a duration of operation of the particle source to produce the corresponding pulse, and where the particle beam is based on the pulses of ionized plasma; and a modulator wheel having different thicknesses, where each thickness extends across a different circumferential length of the modulator wheel, and where the modulator wheel is arranged to receive a precursor to the particle beam and is configured to create a spread-out Bragg peak for the particle beam.

25 Claims, 19 Drawing Sheets